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Lee

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(54) **EJECTION MECHANISM**

(71) Applicant: **Han Sum Enterprise Co., Ltd.**, Tainan (TW)

(72) Inventor: **Te Sheng Lee**, Tainan (TW)

(73) Assignee: **Han Sum Enterprise Co., Ltd.**, Tainan (TW)

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B29C 45/42 (2006.01)
B29C 33/44 (2006.01)
B29C 33/28 (2006.01)
B29C 45/44 (2006.01)

(52) **U.S. Cl.**
CPC ***B29C 33/442*** (2013.01); *B29C 45/4208* (2013.01); *B29C 45/4471* (2013.01); ***B29C 33/28*** (2013.01); *Y10S 425/058* (2013.01)
USPC ..... **425/444**; 425/436 RM; 425/DIG. 58

(58) **Field of Classification Search**
CPC B29C 33/28; B29C 33/34; B29C 33/26; B29C 45/42; B29C 45/4208; B29C 45/44; B29C 45/4471; B21D 45/10; B21D 45/02; B21D 45/06
USPC ..... 425/444, 436 RM, 556, 577, DIG. 58
See application file for complete search history.

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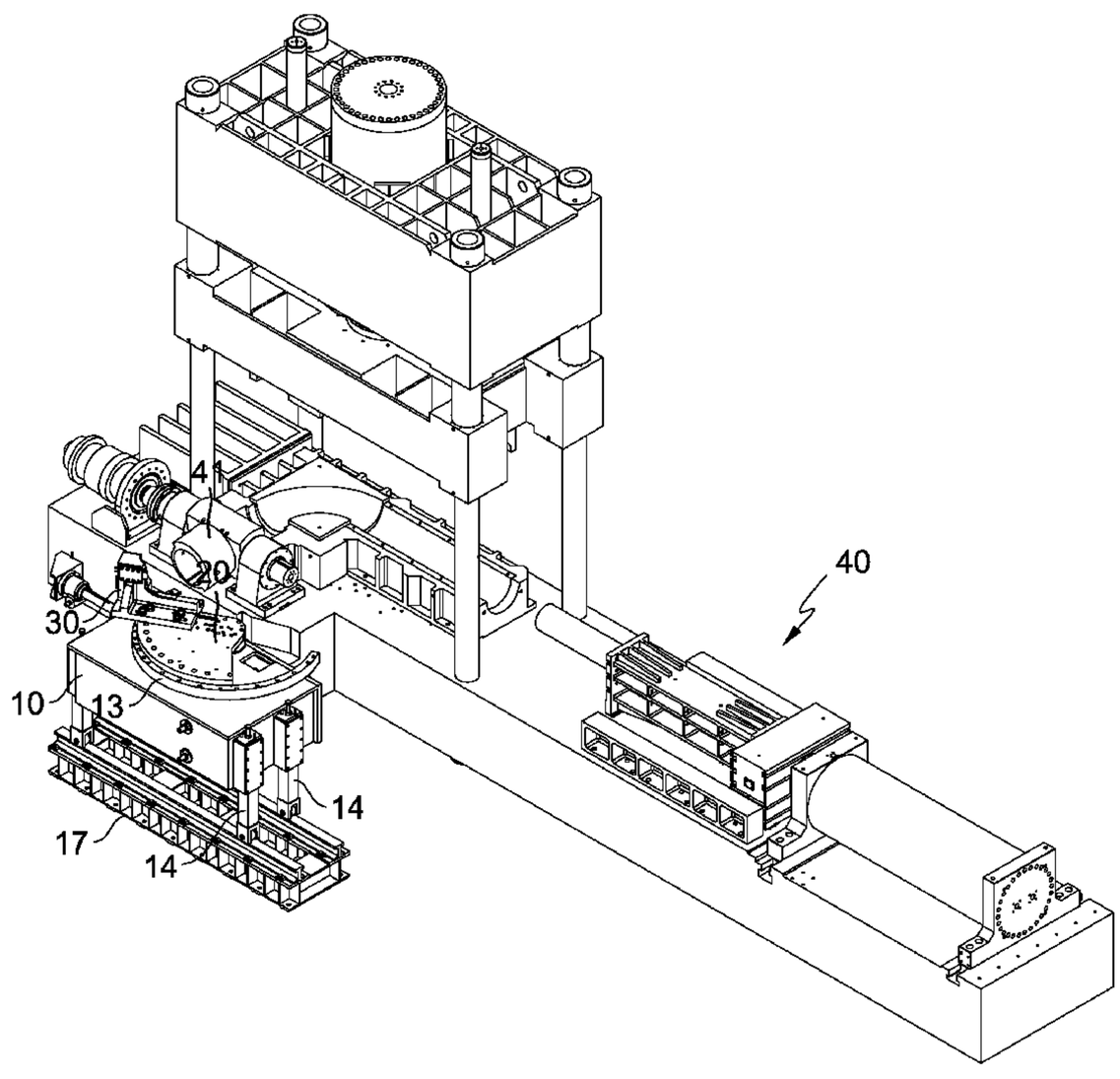
Primary Examiner — Yogendra Gupta
Assistant Examiner — Emmanuel S Luk

(57) **ABSTRACT**

An ejection mechanism has a base, a rotation disk and a feeding station. The base is configured for mounting of the rotation disk and the feeding station, The base further includes an arched guiding track, and the arched guiding track is disposed around the rotating gear. The rotation disk is fan-shaped and is rotatably coupled to the base by a rotating shaft such that the rotation disk is aligned above the arched guiding track. the rotation disk is further provided with an arched row of teeth on a bottom of the rotation disk corresponding to the rotating gear of the base. The rotation disk driven by the rotating gear causes the arched row of teeth to rotate and also to simultaneously cause the rotation disk to rotate around the rotating shaft on the arched guiding track. The ejection mechanism which is suitable for different sizes of elbow pipes.

6 Claims, 18 Drawing Sheets



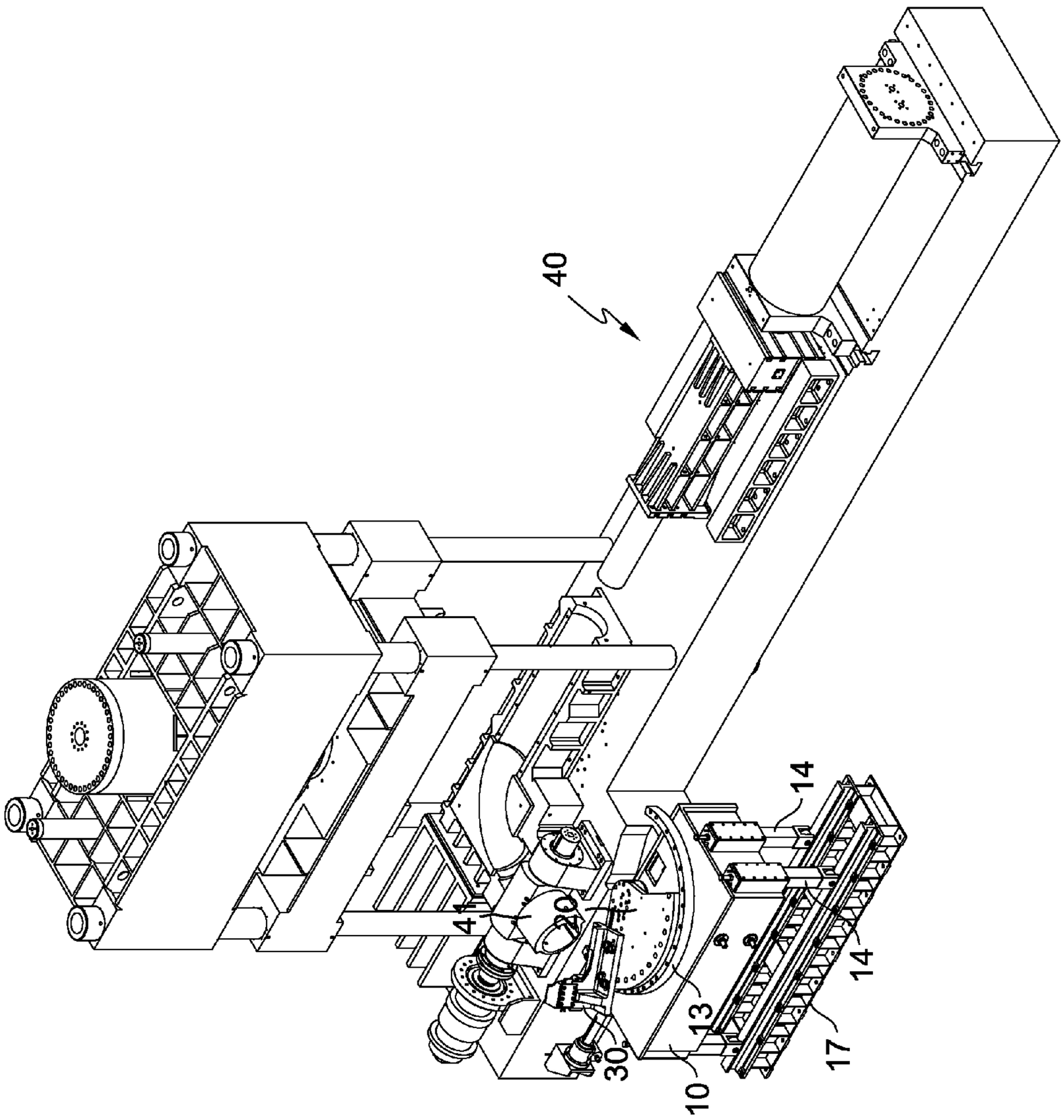


Fig. 1

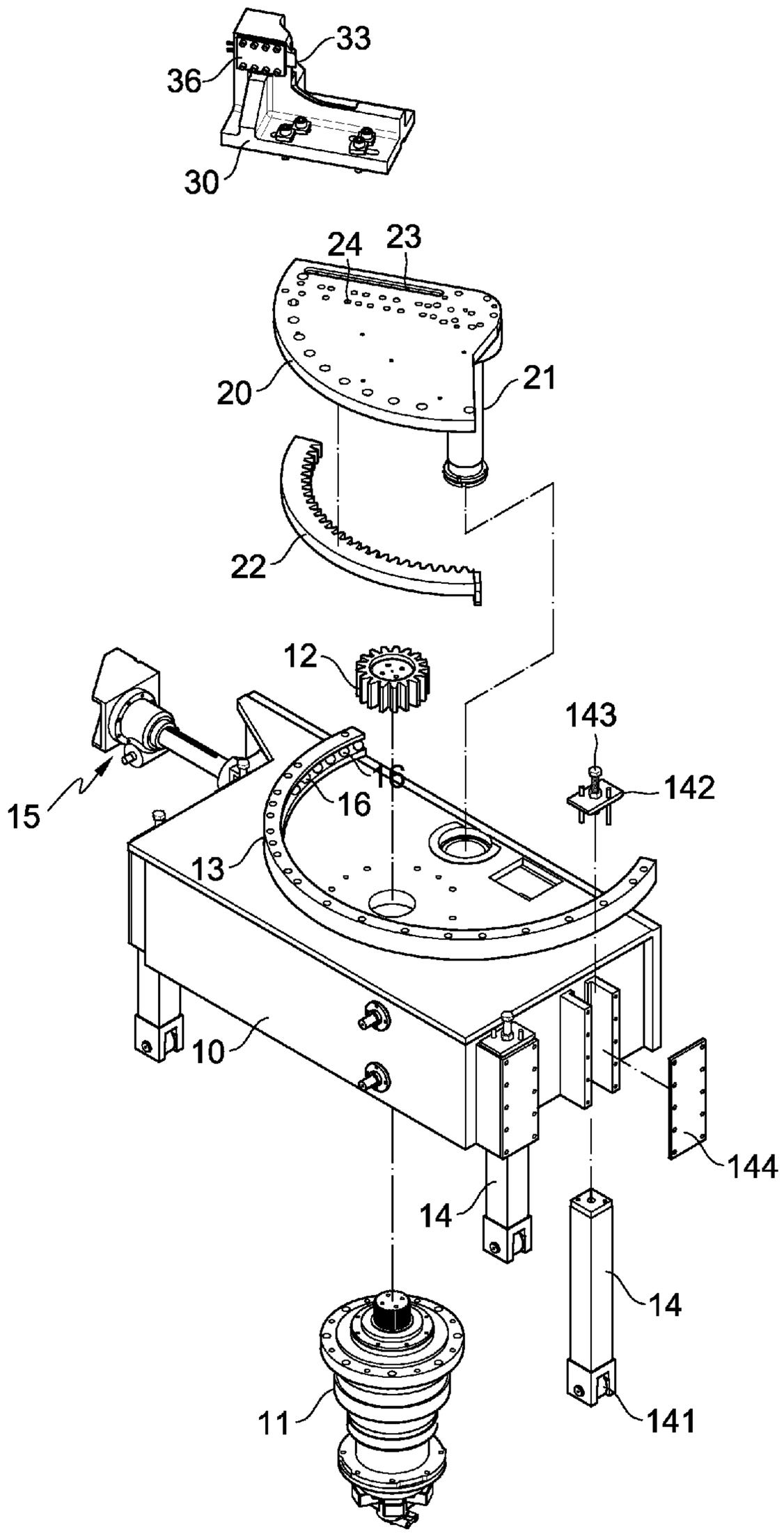


Fig. 2

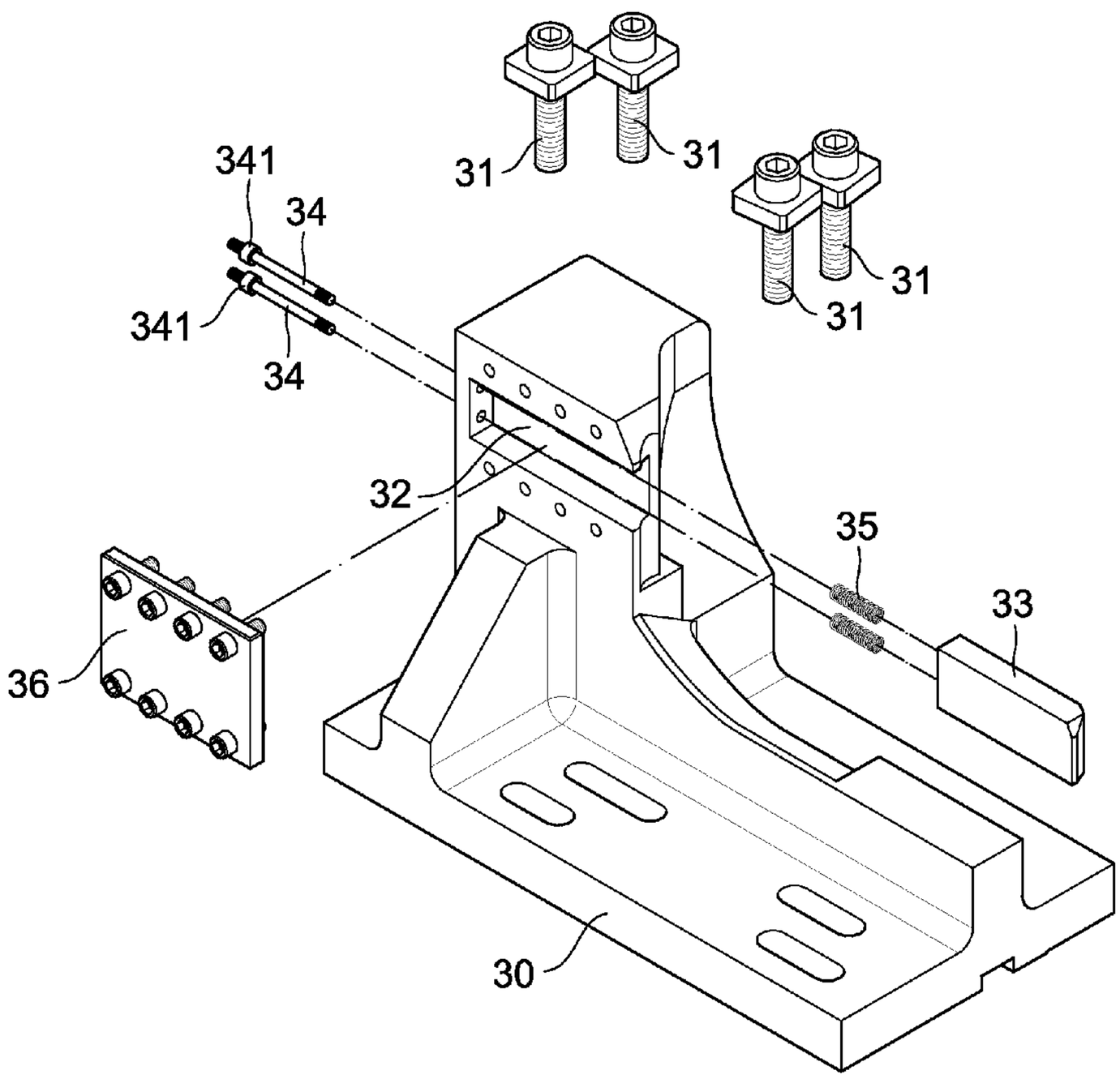


Fig. 3

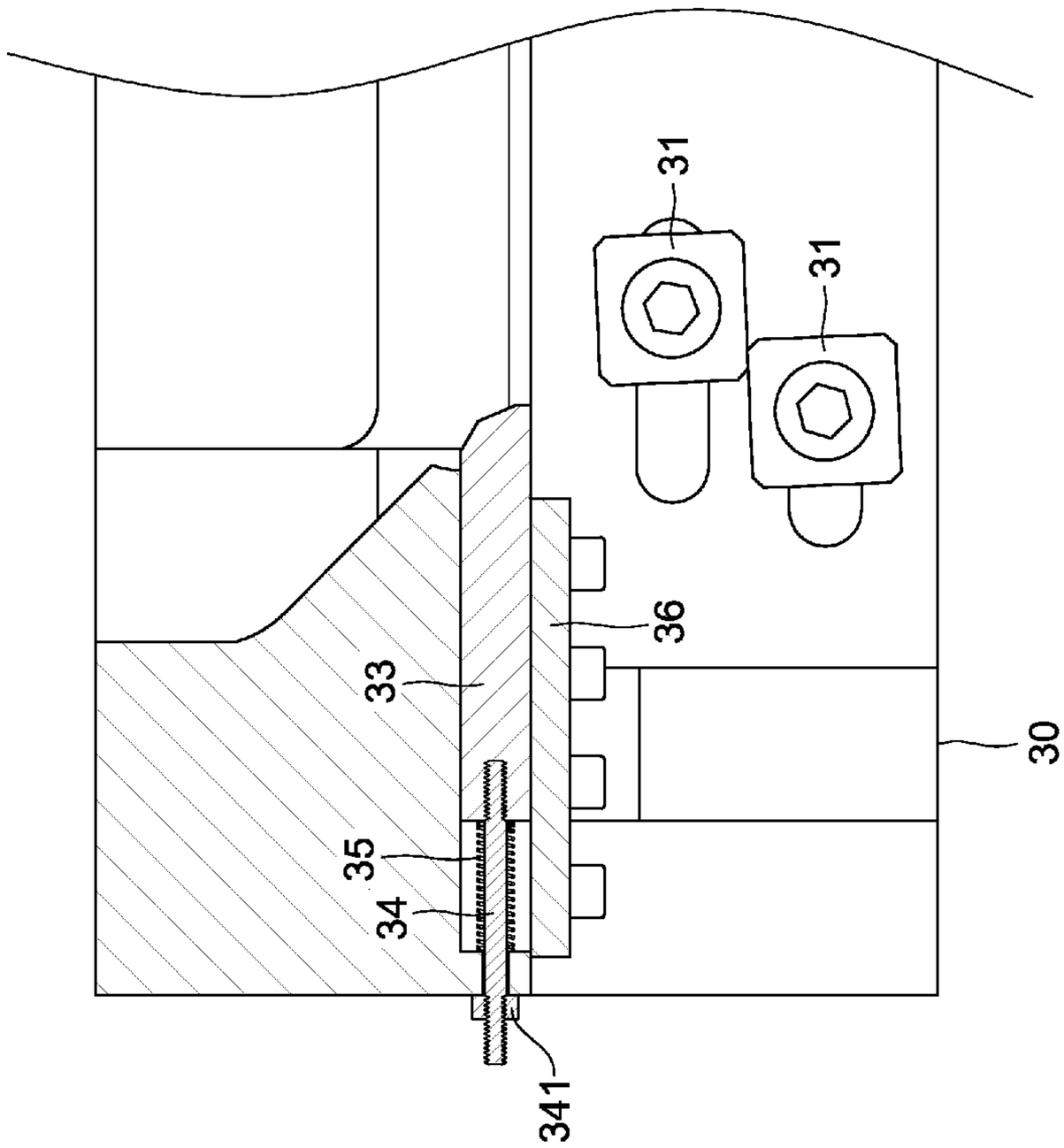


Fig. 4

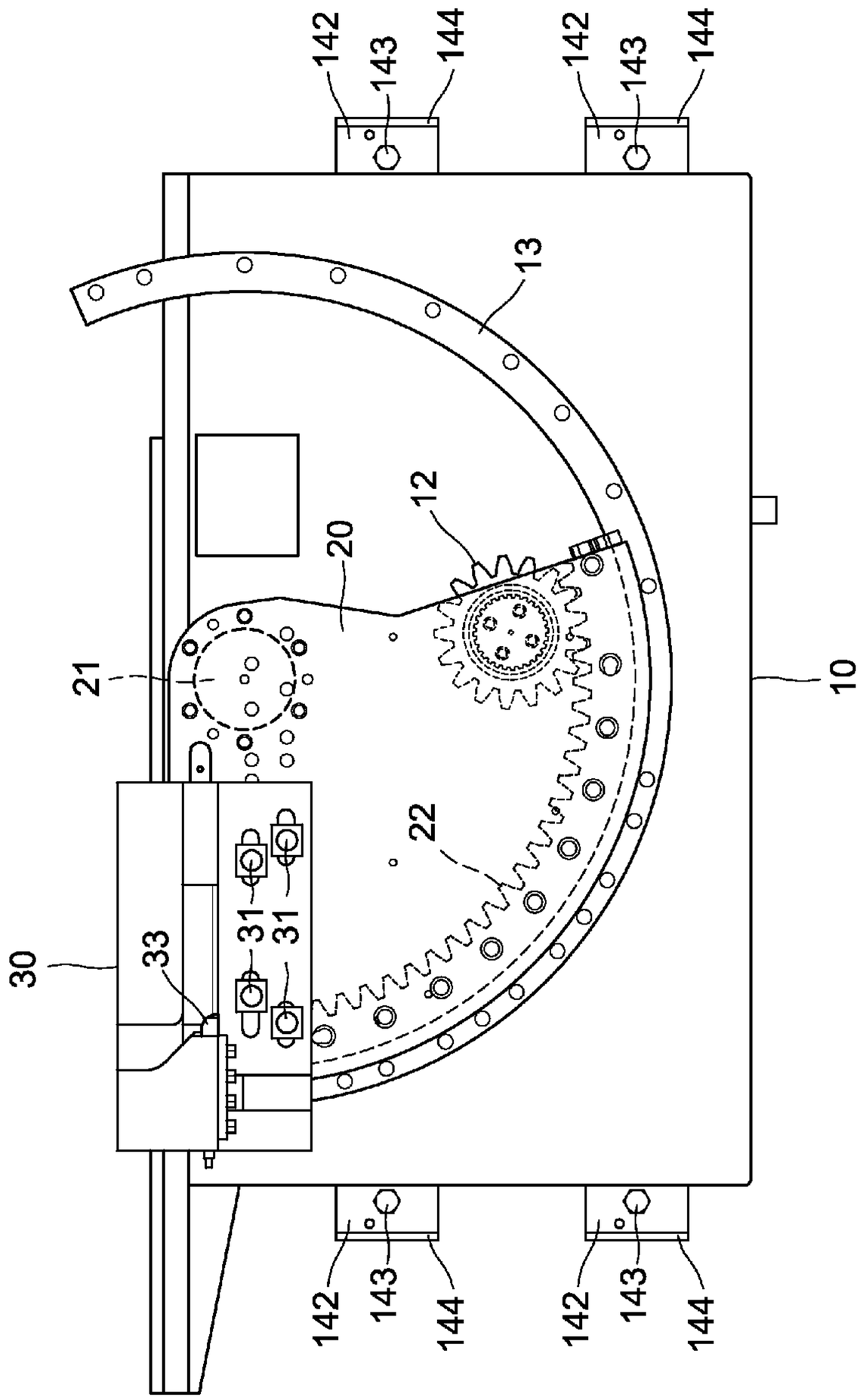

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Fig. 5

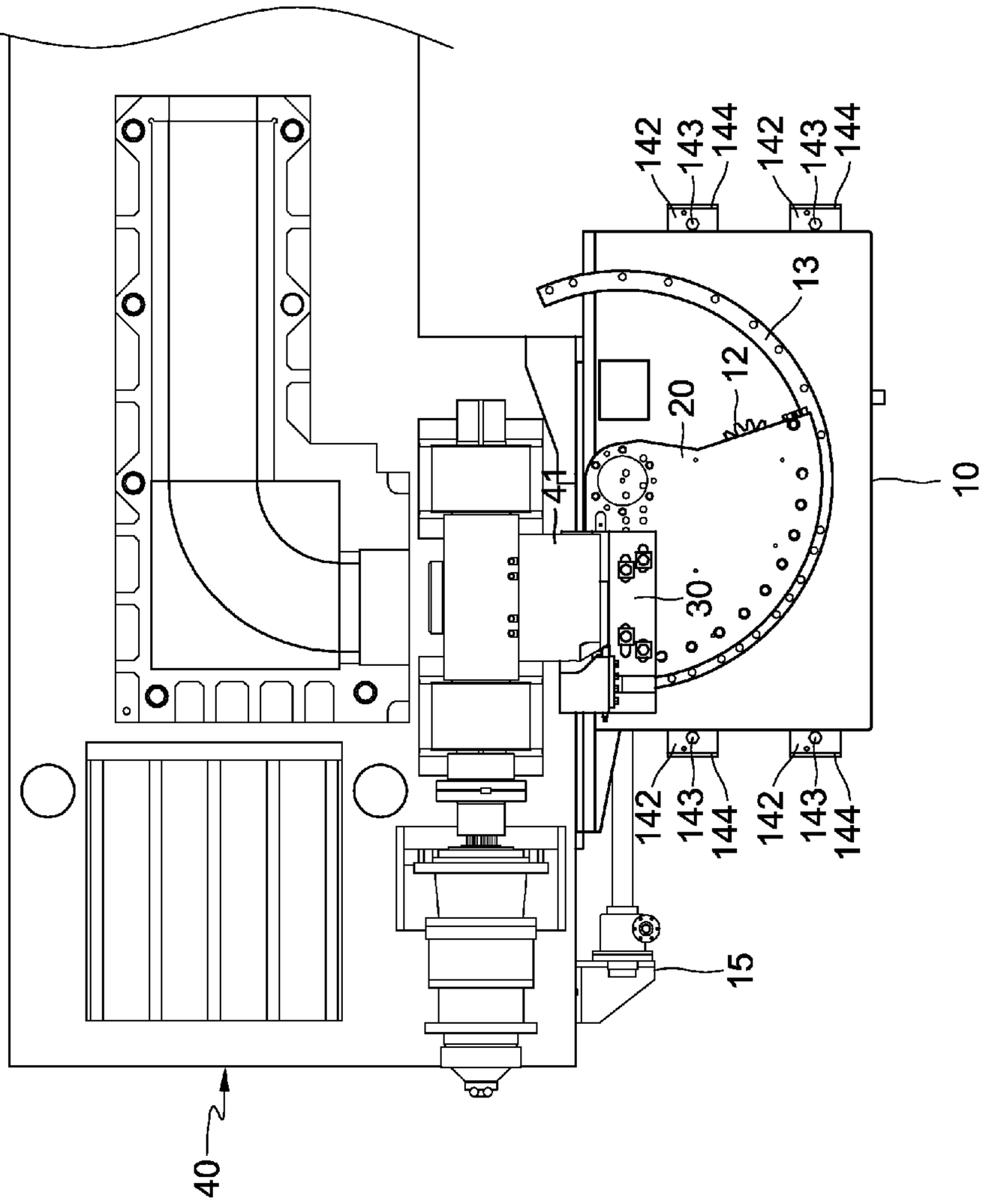
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Fig. 6

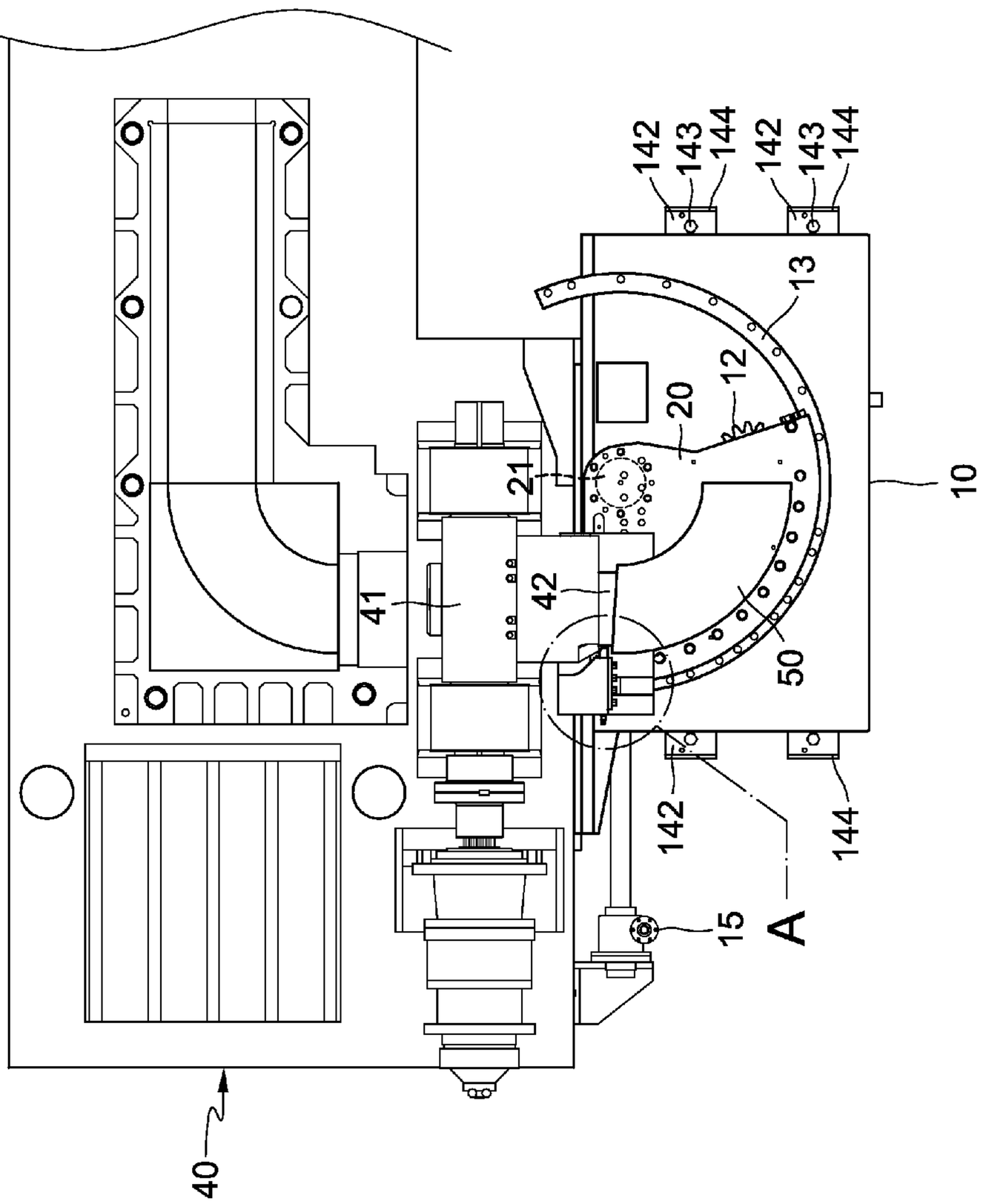

Fig. 7

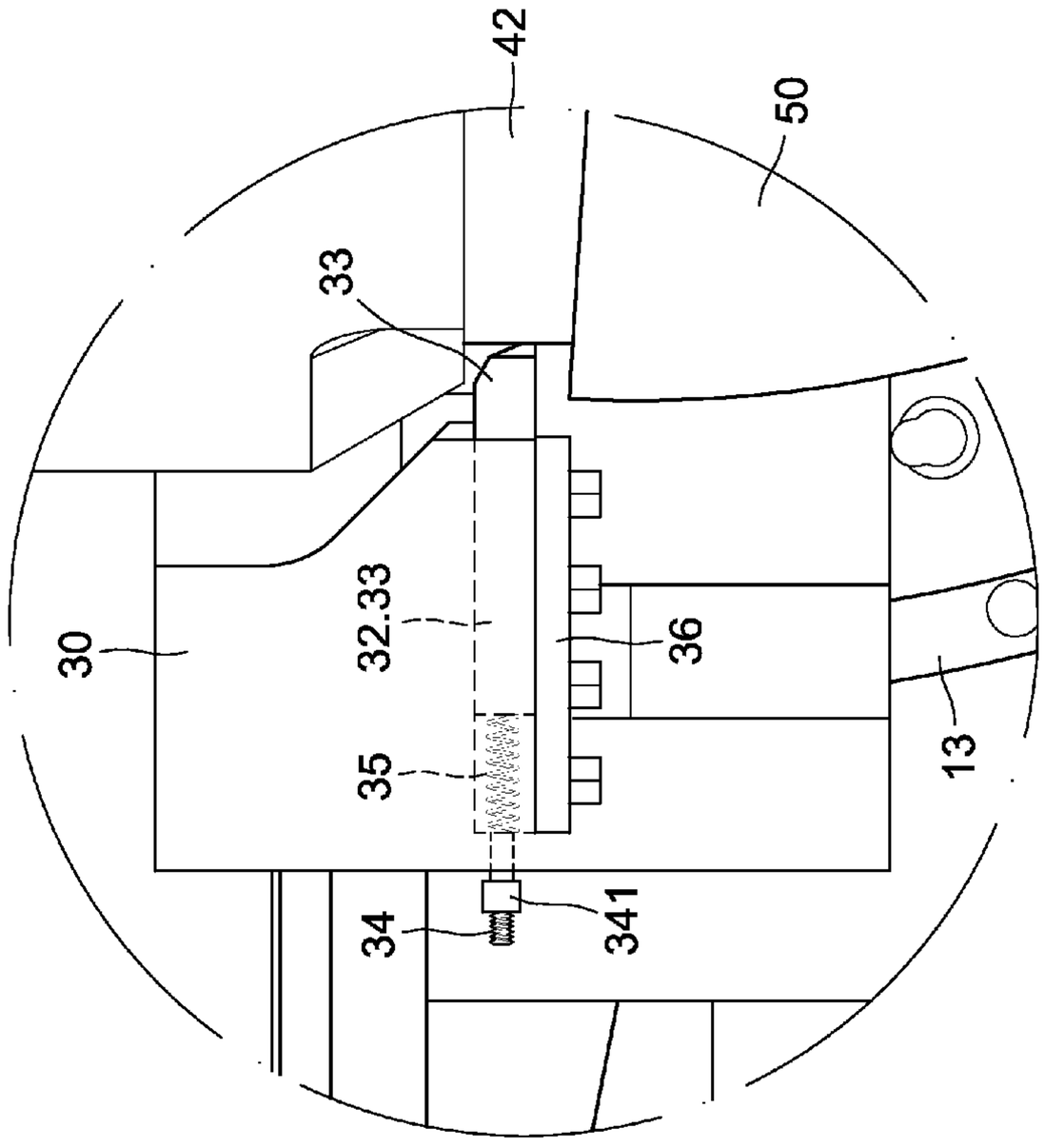

Fig. 8

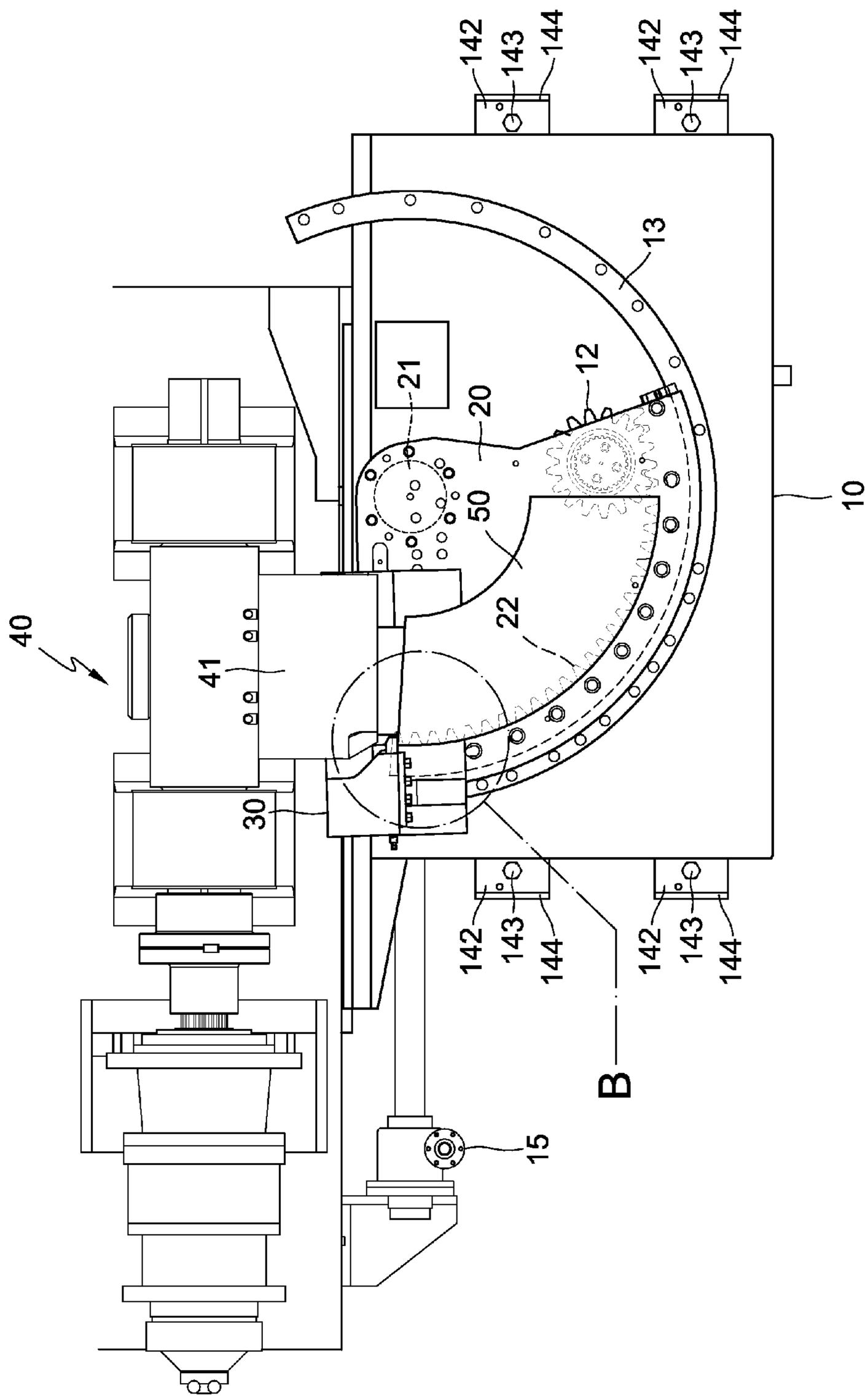
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Fig. 9

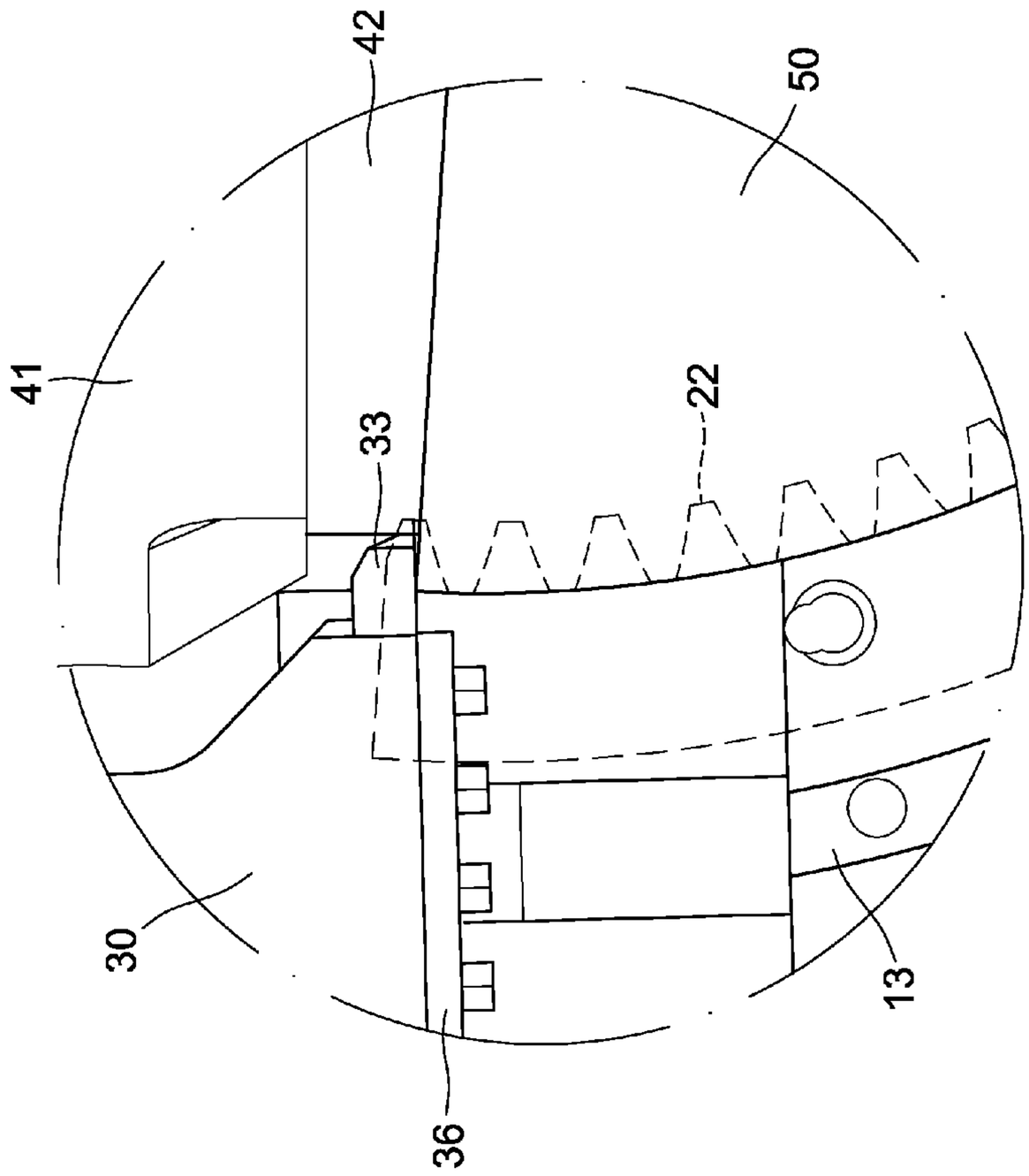

Fig. 10

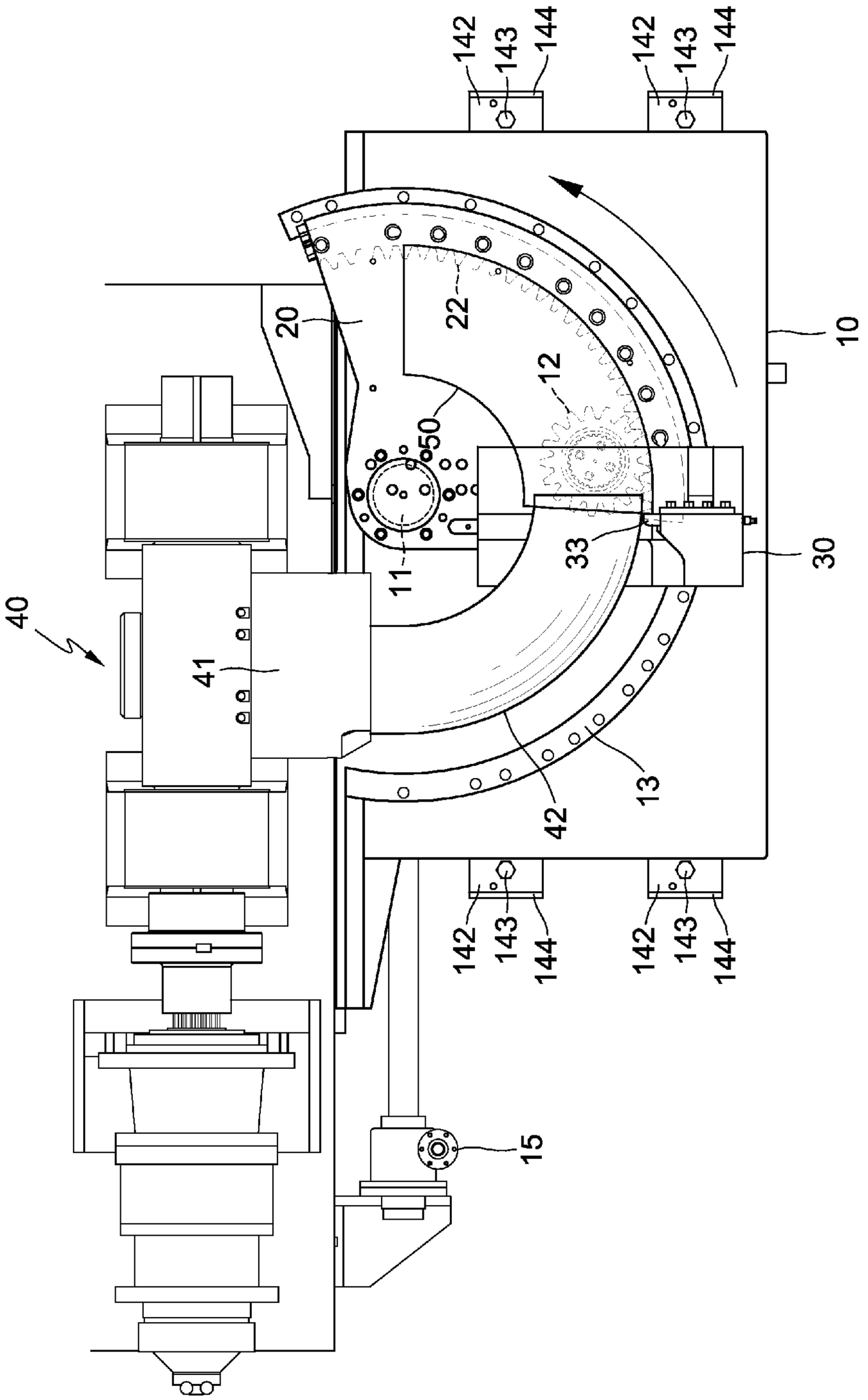
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Fig. 11

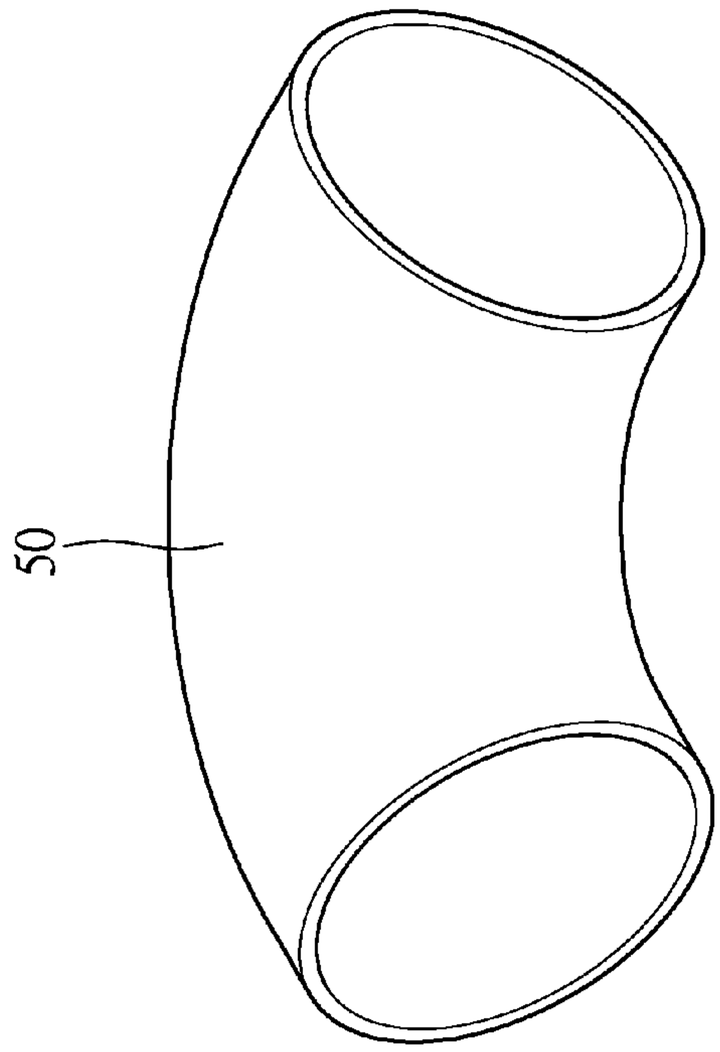

Fig. 12

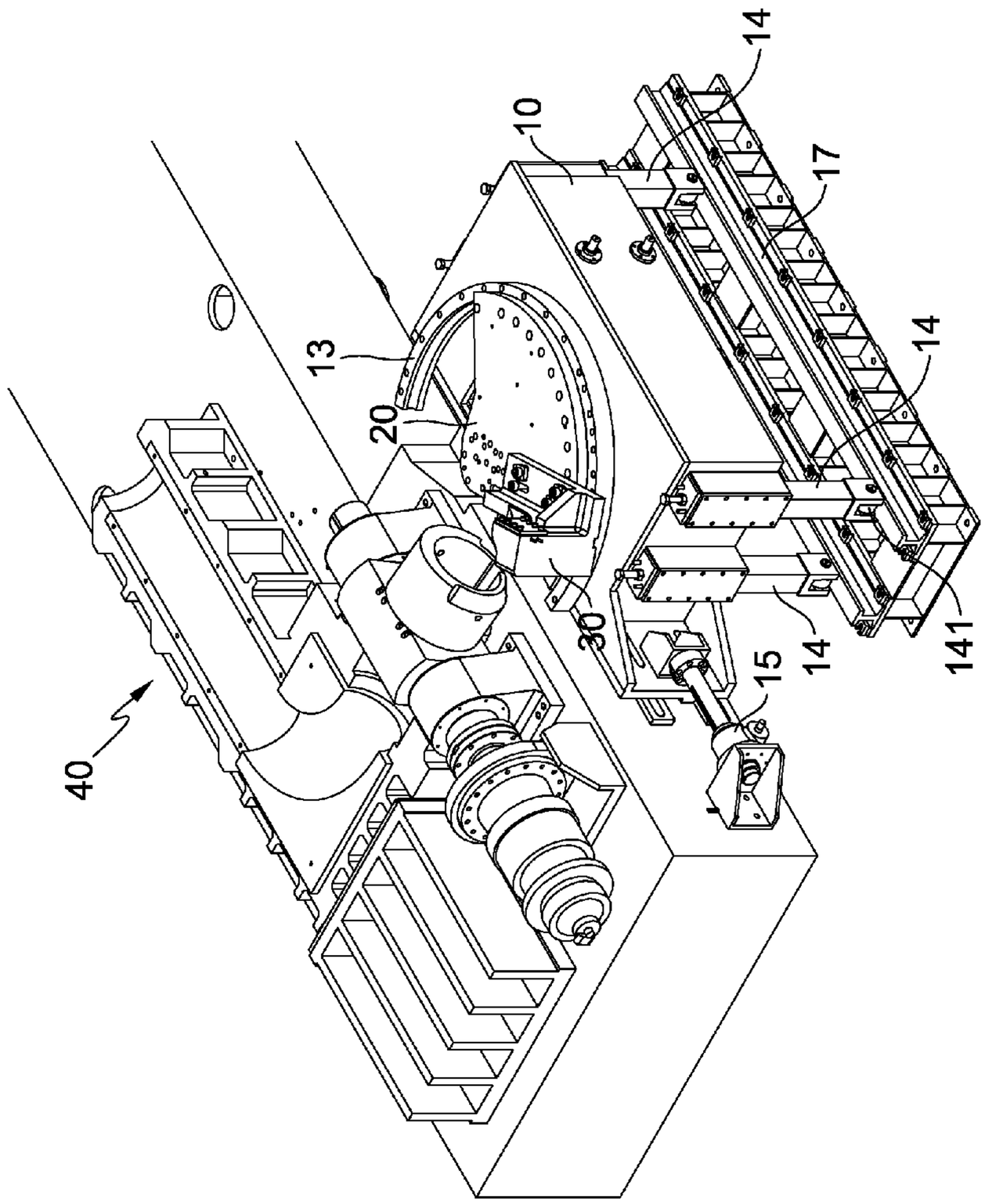

Fig. 13

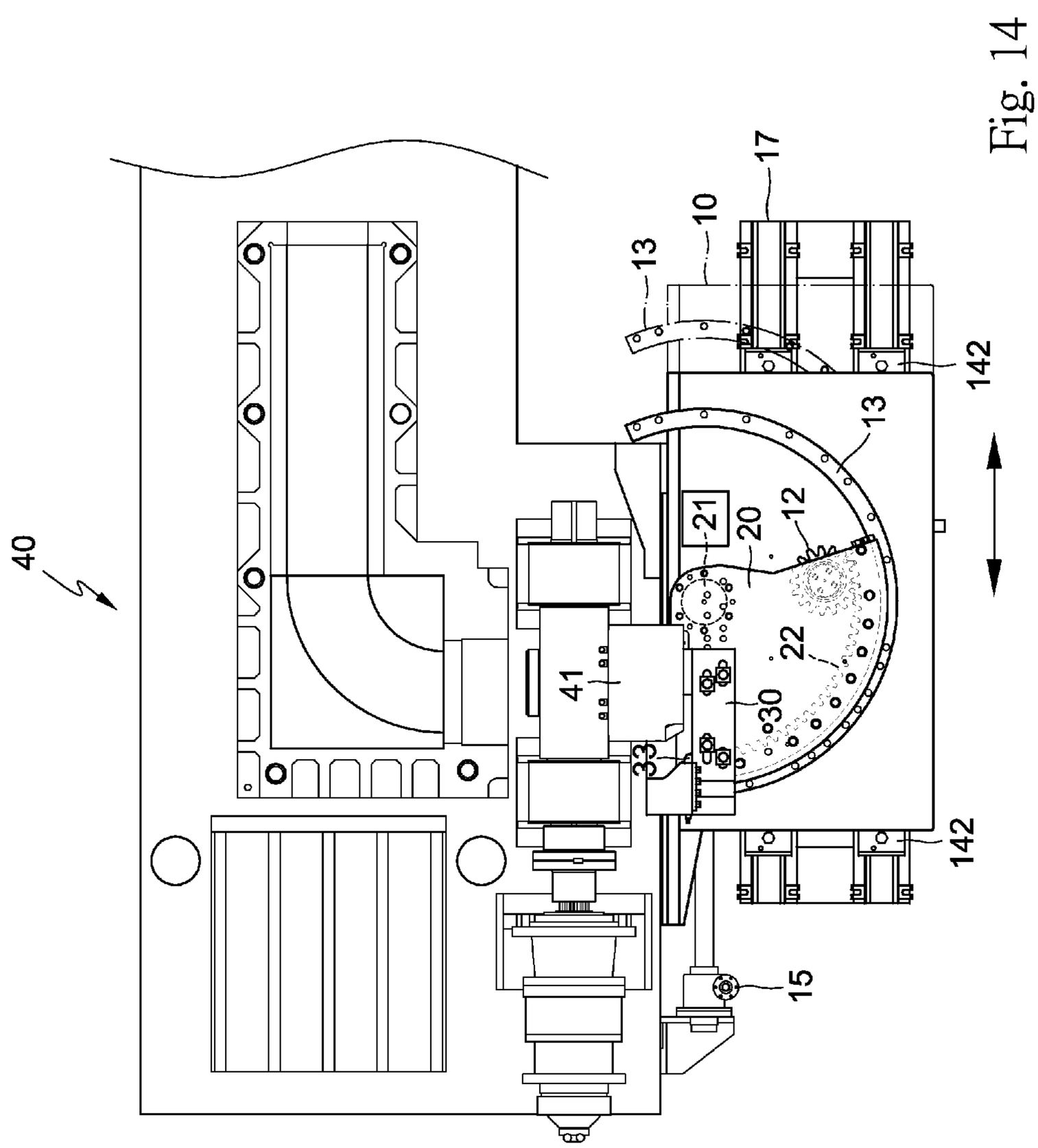

Fig. 14

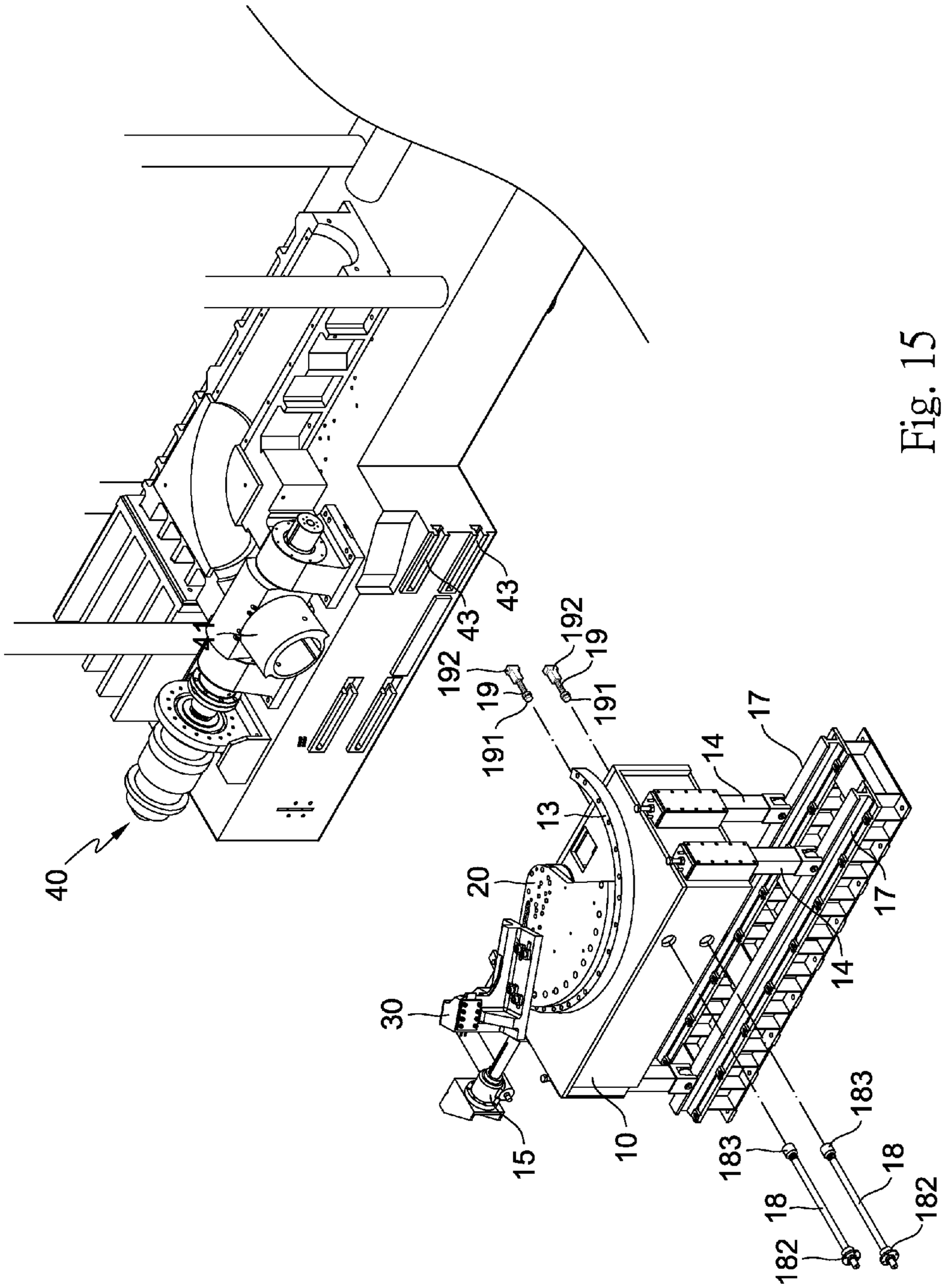
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Fig. 15

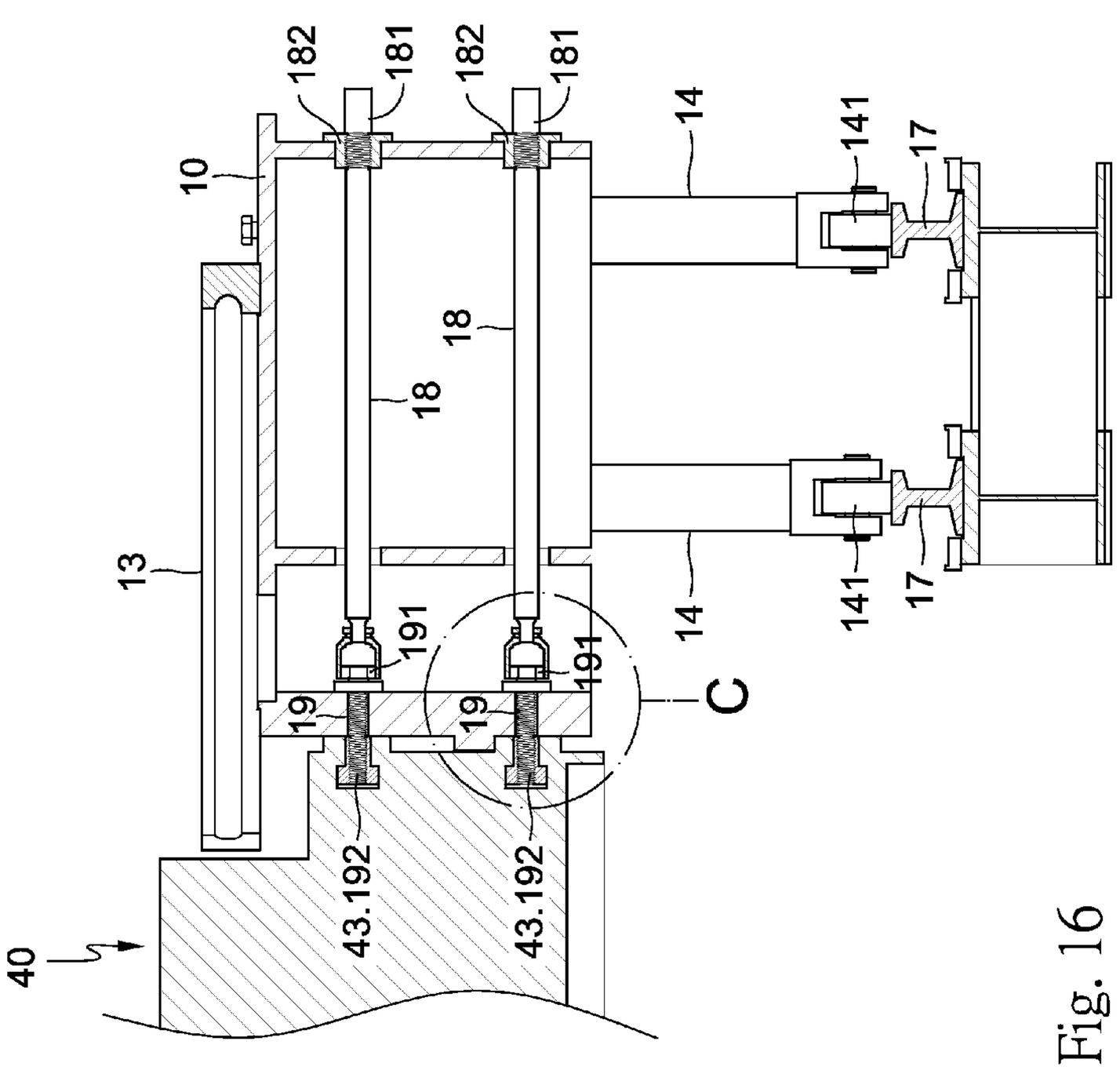
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Fig. 16

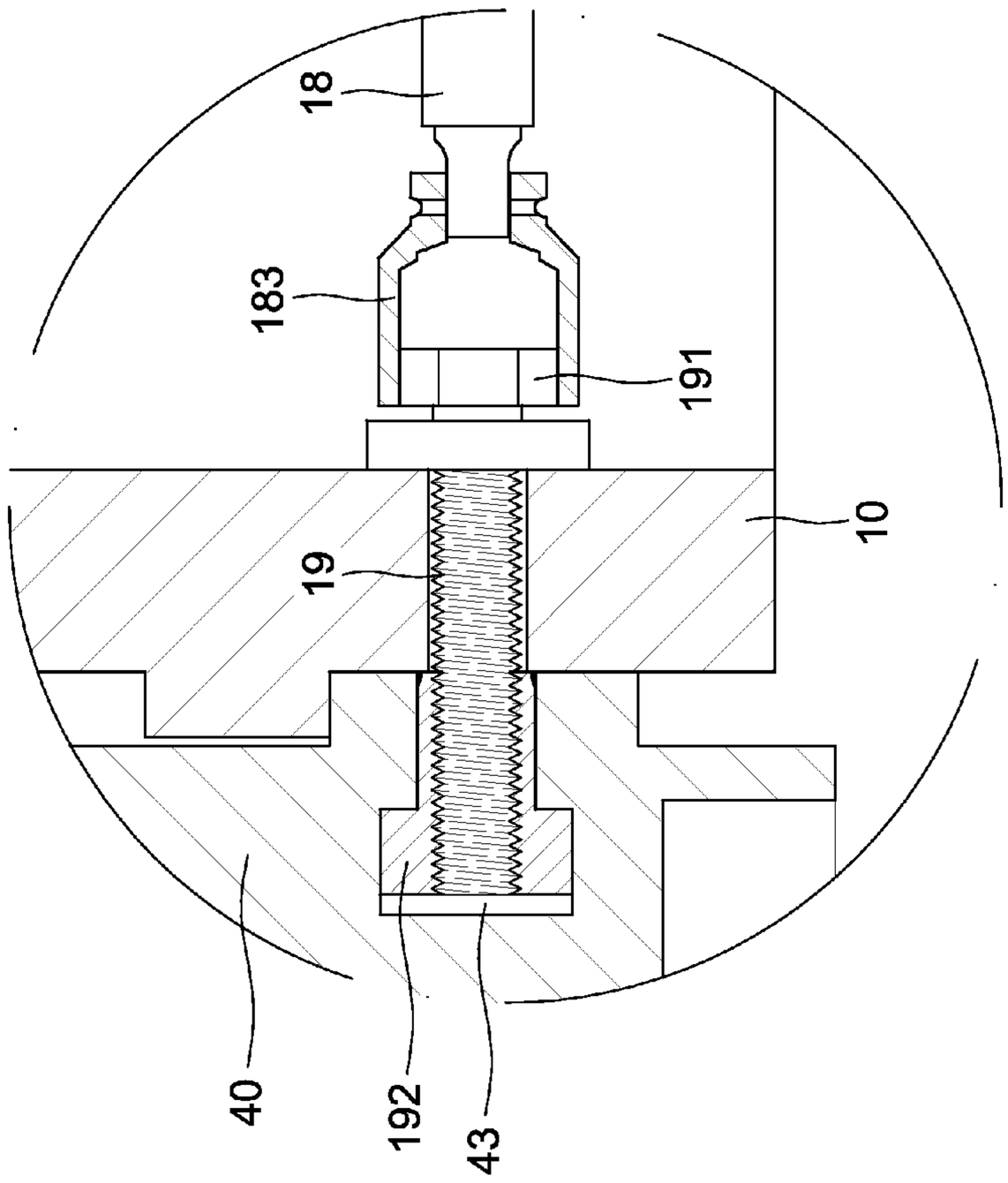

Fig. 17

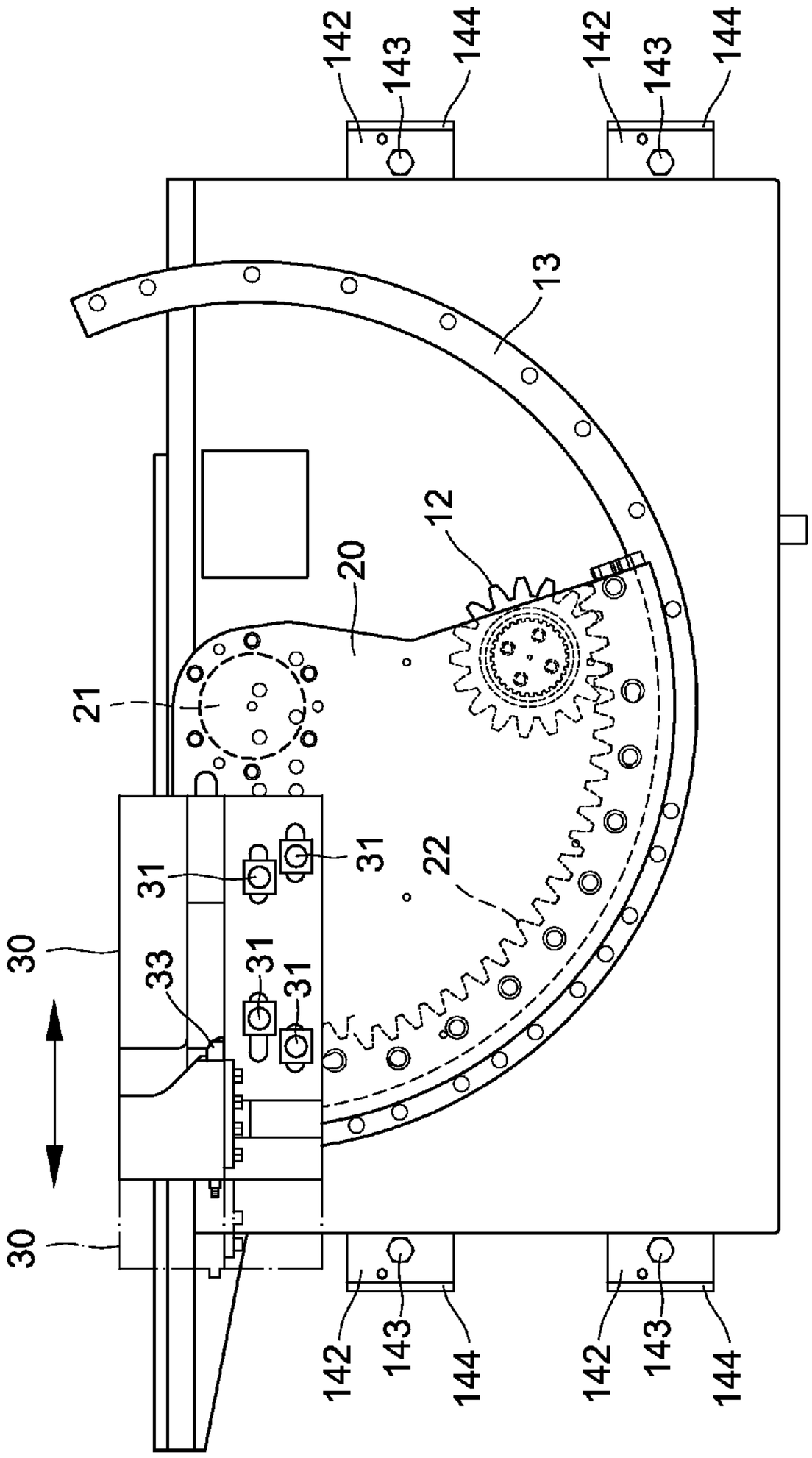
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Fig. 18

EJECTION MECHANISM

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to an ejection mechanism, and more particularly to an ejection mechanism for elbow pipes.

2. Description of Prior Art

Currently, large elbow pipes are formed by a molding method. In order to remove the finished elbow pipe from the forming machine, most common method is manual removal. Another removal method is disclosed in China patent publication No. 201751044, which utilizes a hydraulic cylinder and a pneumatic cylinder to separate elbow pipes from the forming machine. However, it is very difficult to remove the pipe manually and inconvenient to employ both hydraulic cylinder and pneumatic cylinder.

Therefore, it is desirable to provide an ejection mechanism to mitigate and/or obviate the aforementioned problems.

SUMMARY OF THE INVENTION

An objective of the present invention is to provide an ejection mechanism which is suitable for different sizes of elbow pipes.

In order to achieve the above-mentioned objective, an ejection mechanism comprises a base, a rotation disk and a feeding station.

The base is configured for mounting of the rotation disk and the feeding station, the base capable of being disposed adjacent to an elbow pipe forming device and corresponding to a lifting shaft of the elbow pipe forming device.

The base has a driving motor, and the driving motor is rotatably connected to a rotating gear such that the rotating gear is able to be driven by the driving motor to rotate on the base.

The base further includes an arched guiding track, and the arched guiding track is disposed around the rotating gear.

The base further includes a supporting element respectively on two sides of the base, and each supporting element is provided with a rolling wheel at an end of the supporting element.

The rotation disk is fan-shaped and is rotatably coupled to the base by a rotating shaft such that the rotation disk is aligned above the arched guiding track; and the rotation disk is further provided with an arched row of teeth on a bottom of the rotation disk corresponding to the rotating gear of the base, and the arched row of teeth are adjacent to an inner edge of the arched guiding track of the base.

the rotation disk driven by the rotating gear causes the arched row of teeth to rotate and also to simultaneously cause the rotation disk to rotate around the rotating shaft on the arched guiding track.

The rotation disk further includes a guiding slot and a plurality of securing holes.

The feeding station is coupled to the guiding slot and locked with the screw holes of the rotation disk with a plurality of securing members, the feeding station further including a limiting slot with a feeding member, an end of the feeding member pivoted with a limiting rod, another end of the limiting rod protruding through the limiting slot and connected to a stopping block.

The limiting rod is jacketed with a spring and two ends of the spring respectively push against the limiting slot and the feeding member such that the feeding member is pushed out by the spring and stopped by the stopping block.

The limiting slot is covered by a cover configured to secure the feeding member.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a perspective drawing of an ejection mechanism with an elbow pipe forming device according to an embodiment of the present invention.

FIG. **2** is an exploded drawing of the ejection mechanism according to the embodiment of the present invention.

FIG. **3** is an exploded drawing of a feeding station according to the embodiment of the present invention.

FIG. **4** is a cross-section view of the feeding station according to the embodiment of the present invention.

FIG. **5** is a top view of the ejection mechanism according to the embodiment of the present invention.

FIG. **6** is a top view of the ejection mechanism and the elbow pipe forming device mechanism according to the embodiment of the present invention.

FIG. **7** is a top view of the feeding member mechanism according to the embodiment of the present invention.

FIG. **8** is a local detail view of the section A shown in FIG. **7**.

FIG. **9** is a top view of the ejection mechanism and the feeding member according to the embodiment of the present invention.

FIG. **10** is a local detail view of the section B shown in FIG. **9**.

FIG. **11** is a top view of showing rotations of the feeding member.

FIG. **12** is a schematic drawing of an elbow pipe.

FIG. **13** is a perspective drawing of a screw driving mechanism being mounted between ejection mechanism and the elbow pipe forming device according to the embodiment of the present invention.

FIG. **14** is a top view of showing the movements of the base according to the embodiment of the present invention.

FIG. **15** is an exploded drawing of the base with a locking rod and a positioning rod according to the embodiment of the present invention.

FIG. **16** is a cross-section view of a T-shaped block of a positioning rod pushing against to a T-shaped slot of the elbow pipe forming device according to the embodiment of the present invention.

FIG. **17** is a local detail view of the section C shown in FIG. **16**.

FIG. **18** is a top view of showing the feeding station at a different position on the rotation disk according to the embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

In a preferred embodiment, an ejection mechanism comprises a base **10**, a rotation disk **20** and a feeding station **30**.

The base **10** (please refer to FIGS. **5** and **6**) is configured for mounting of the rotation disk **20** and the feeding station **30**, and the base **10** is capable of being disposed adjacent to an elbow pipe forming device **40** and corresponding to a lifting shaft **41** of the elbow pipe forming device **40**. The base **10** has a driving motor **11**, and the driving motor **11** is rotatably connected to a rotating gear **12** such that the rotating gear **12** is able to be driven by the driving motor **11** to rotate on the base **10**. The base **10** further includes an arched guiding track **13**, and the arched guiding track **13** is disposed around the rotating gear **12**. The base **10** further includes a supporting element **14** respectively on two sides of the base **10**, and each supporting element **14** is provided with a rolling wheel **141** at

an end of the supporting element **14**. The supporting element **141** are pivoted onto two opposite sides of the base **10** and assembled with a top board **142**, an adjustable bolt **143**, and a side board **144**. The rolling wheels **141** of the supporting elements **14** are used for moving the base **10**, and the adjustable bolt **143** is used for adjusting height of the base **10**.

The rotation disk **20** (please refer to FIG. **5**) is fan-shaped and is rotatably coupled to the base **10** by a rotating shaft **21** such that the rotation disk **20** is aligned above the arched guiding track **13**. The rotation disk **20** is further provided with an arched row of teeth **22** on a bottom of the rotation disk **20** corresponding to the rotating gear **12** of the base **10**, and the arched row of teeth **22** are adjacent to an inner edge of the arched guiding track **13** of the base **10**. The rotation disk **20** driven by the rotating gear **12** causes the arched row of teeth **22** to rotate and also to simultaneously cause the rotation disk **20** to rotate around the rotating shaft **21** on the arched guiding track **13**. Furthermore, the rotation disk **20** is provided with a guiding slot **23** and a plurality of securing holes **24**.

The feeding station **30** (please refer to FIGS. **3**, **4** and **5**) is coupled to the guiding slot **23** and locked with the screw holes **24** of the rotation disk **20** with a plurality of securing members **31**. The feeding station **30** further including a limiting slot **32** with a feeding member **33**, an end of the feeding member **33** is pivoted with a limiting rod **34**, and another end of the limiting rod **34** is protruding through the limiting slot **32** and connected to a stopping block **341**. The limiting rod **34** is jacketed with a spring **35** and two ends of the spring **35** respectively push against the limiting slot **32** and the feeding member **33** such that the feeding member **33** is pushed out by the spring **35** and stopped by the stopping block **341**. The limiting slot **32** is covered by a cover **35** configured to secure the feeding member **33**.

As shown in FIG. **6**, the base **10** is placed at an opposite side of the elbow pipe forming device **40**, the rotation disk **20** is corresponding to the lifting shaft **41** of the elbow pipe forming device **40**, and the feeding station **30** is placed between the base **10** and the lifting shaft **41**. As shown in FIGS. **7** and **8**, when the lifting shaft **41** of the elbow pipe forming device **40** lifts and rotates the mold core **42** and the elbow pipe **50** next to the ejection mechanism **10** such that the mold core **42** is above the feeding station **30** and the elbow pipe **50** is above the rotation disk **20**. Meanwhile, a front end of the feeding member **33** of the feeding station **30** pushes against an edge of the mold core **42**. When the rotating gear **12** rotates counter-clockwise to drive the arched row of teeth **22** of the rotation disk **20**, the rotation disk **20** rotates around the rotating shaft **21** and causes the feeding station **30** to rotate simultaneously, such that the feeding member **33** of the feeding station **30** pushes against an opening of the elbow pipe **50** (as shown in FIGS. **9** and **10**). Furthermore, the rotating gear **12** continuously rotates the rotation disk **20** counter-clockwise, with the rotation of the rotation disk **20**, the feeding member **33** pushes out the elbow pipe **50** out from the mold core **42** (as shown in FIG. **11**) to obtain the finished elbow pipe **50** (as shown in FIG. **12**). Finally, the lifting shaft **41** of the elbow pipe forming device **40** lifts and rotate the mold core **42** and the elbow pipe **50** back to the original position for next procedure.

As shown in FIGS. **13** and **14**, a screw drive mechanism **15** is coupled to the base **10**, and an end of the screw drive mechanism **15** is coupled to the elbow pipe forming device **40**, such that the base **10** is capable of being driven by the screw drive mechanism **15** to move along elbow pipe forming device **40**.

As shown in FIG. **2**, the arched guiding track **13** further comprises a plurality of ball bearings **16** configured to improve movement of the arched row of teeth **22** along the arched guiding track **13**.

As shown in FIGS. **13**, **14** and **15**, the base **10** further comprises two sliding tracks **17**, and the sliding track **17** is respectively disposed below the supporting elements **14** and engage with the rolling wheels **141** of the supporting elements **14**.

Moreover, As shown in FIGS. **15**, **16** and **17**, the base **10** includes a locking rod **18**, the locking rod **18** has a threaded section **181** at an end engaging with the base **10** by a securing member **182**, and another end of the locking rod **18** is rotatably connected to a rotatable engaging member **183**. The engaging member **183** is preferably a hexagon-shaped. A positioning rod **19** utilizes an engaging block **191** to correspondingly engage with the engaging member **183** of the locking rod **18**. Another end of the positioning rod **19** provided with a T-shaped block **192** that correspondingly engages with a T-shaped slot **43** disposed on a front side of the elbow pipe forming device **40**. With backward movement of the securing member **182** and the threaded section **181** of the locking rod **18**, the positioning rod **19** also moves backward, and the T shaped block **192** of the positioning rod **19** engages tightly with the T shaped slot **43** of the elbow pipe forming device **40** such that the base **10** also securely engages with the elbow pipe forming device **40**.

With the above-mentioned description, following benefits can be obtained:

(A) Since the rotating gear **12** rotates the rotation disk **20** to make the feeding member **33** to push out the elbow pipe **50** out from the mold core **42**, there is no need for manual or both hydraulic cylinder and pneumatic cylinder removal.

(B) The rotating gear **12** directly drives the arched row of teeth **22** of the rotation disk **20**, therefore the feeding station **30** is capable of pushing the elbow pipe **50** smoothly.

(C) The feeding station **30** is secured onto the rotation disk **20** and its position is adjustable according to the guiding slot **23** (as shown in FIG. **18**), which is designed for different sizes of the mold core **42** and the elbow pipe **50** when the feeding member **33** of the feeding station **30** pushes the elbow pipe **50** out from the mold core **42**.

(D) The feeding member **33** of the feeding station **30** is pushes out by the spring **35** to make contact with the mold core **42** and the elbow pipe **50**, which provides accuracy, efficiency and convenience.

(E) The supporting element **14** and the rolling wheel **141** of the base **10** allow the base **10** to be moved for different sizes of the elbow pipe **50**, such that the rotation disk **20** and the feeding station **30** disposed on the base **10** is able to push the elbow pipe **50** out from the mold core **42**.

(F) The T-shaped block **192** of the positioning rod **19** correspondingly engages with a T-shaped slot **43** disposed on a front side of the elbow pipe forming device **40**, with backward movement of the securing member **182** and the threaded section **181** of the locking rod **18**, the positioning rod **19** also moves backward, and the T shaped block **192** of the positioning rod **19** engages tightly with the T shaped slot **43** of the elbow pipe forming device **40** such that the base **10** also securely engages with the elbow pipe forming device.

Although the present invention has been described with reference to the foregoing preferred embodiments, it will be understood that the invention is not limited to the details thereof. Various equivalent variations and modifications can still occur to those skilled in this art in view of the teachings of the present invention. Thus, all such variations and equiva-

lent modifications are also embraced within the scope of the invention as defined in the appended claims.

What is claimed is:

1. An ejection mechanism comprising:

a base;

a rotation disk; and

a feeding station;

wherein the base is configured for mounting of the rotation disk and the feeding station, the base capable of being disposed adjacent to an elbow pipe forming device and corresponding to a lifting shaft of the elbow pipe forming device;

the base has a driving motor, and the driving motor is rotatably connected to a rotating gear such that the rotating gear is able to be driven by the driving motor to rotate on the base;

the base further includes an arched guiding track, and the arched guiding track is disposed around the rotating gear;

the base further includes a supporting element respectively on two sides of the base, and each supporting element is provided with a rolling wheel at an end of the supporting element;

the rotation disk is fan-shaped and is rotatably coupled to the base by a rotating shaft such that the rotation disk is aligned above the arched guiding track; and the rotation disk is further provided with an arched row of teeth on a bottom of the rotation disk corresponding to the rotating gear of the base, and the arched row of teeth are adjacent to an inner edge of the arched guiding track of the base;

the rotation disk driven by the rotating gear causes the arched row of teeth to rotate and also to simultaneously cause the rotation disk to rotate around the rotating shaft on the arched guiding track;

the rotation disk further includes a guiding slot and a plurality of securing holes;

the feeding station is coupled to the guiding slot and locked with the screw holes of the rotation disk with a plurality of securing members, the feeding station further including a limiting slot with a feeding member, an end of the feeding member pivoted with a limiting rod, another end of the limiting rod protruding through the limiting slot and connected to a stopping block;

the limiting rod is jacketed with a spring and two ends of the spring respectively push against the limiting slot and the feeding member such that the feeding member is pushed out by the spring and stopped by the stopping block; and

the limiting slot is covered by a cover configured to secure the feeding member.

2. The ejection mechanism as claimed in claim **1**, wherein the supporting elements are pivoted onto two opposite sides of the base and assembled with a top board, an adjustable bolt, and a side board, to configure the base for varying movements and heights.

3. The ejection mechanism as claimed in claim **1**, wherein a screw drive mechanism is coupled to the base, and an end of the screw drive mechanism is coupled to the elbow pipe forming device, such that the base is capable of being driven by the screw drive mechanism to move along elbow pipe forming device.

4. The ejection mechanism as claimed in claim **1**, wherein the arched guiding track further comprises a plurality of ball bearings configured to improve movement of the arched row of teeth along the arched guiding track.

5. The ejection mechanism as claimed in claim **1**, wherein the base further comprises at least one sliding track, the sliding track disposed below the supporting elements and engaging with the rolling wheels of the supporting elements.

6. The ejection mechanism as claimed in claim **1**, wherein the base further includes a locking rod, the locking rod having a threaded section at an end engaging with the base, and another end of the locking rod is rotatably connected to a rotatable engaging member, and a positioning rod utilizes an engaging block to engage with the engaging member of the locking rod, another end of the positioning rod provided with a T-shaped block that correspondingly engages with a T-shaped slot disposed on a front side of the elbow pipe forming device.

* * * * *